

Hydroxyl and superoxide anion radical scavenging activities of natural source antioxidants using the computerized JES-FR30 ESR spectrometer system.

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Abstract

Free radical scavenging activities of water-soluble extracts from some natural sources, health foods, and antioxidant substances were measured using the JES-FR30 JEOL spectrometer. The objective was to develop a standardized method whereby comparison could be made between the radical scavenging activities of complex mixtures. Scavenging of hydroxyl radical was determined using DMPO.

Activity was calibrated using a standard material, L-ascorbic acid 2-[3,4-dihydro-2,5,7,8-tetramethyl-2-(4,8,12-trimethyltridecyl)-2H -1- benzopyran-6yl-hydrogen phosphate] potassium salt (EPC-K1), an analog of vitamin C and vitamin E which is water soluble and stable at room temperature. The order of greatest hydroxyl radical scavenging activity was green tea extract, pine bark extract (Pycnogenol), Ginkgo Biloba extract (EGb 761), a flavonoid blend of several fruit and vegetable extracts (GNLD), and Bio-Normalizer (Sun-O Corp). Activity was determined after treatment of samples with ascorbic acid oxidase. This treatment revealed the presence of ascorbate in some natural extracts and commercial preparations. The pine bark extract was the most heat resistant and had ascorbate-like activity in the preparations. Scavenging of superoxide anion was determined using the spin trap, 5,5-dimethyl-1-pyrroline-N-oxide (DMPO), and analyzed by comparison with a standard curve made with superoxide dismutase. Comparison of the water solubilized components of natural source antioxidants showed that filtrates fractionated using centrifuge type Millipore filter tubes (M.W. < 100,000; M.W. < 10,000) also had almost the same SOD-like activity. Samples were also treated with ascorbate oxidase or by heating (100 degrees C for 10 min). The order of activity, from greatest to least, was Ginkgo biloba extract EGb 761, pycnogenol, beta-catechin, tea and BioNormalizer.